Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature							

General Certificate of Secondary Education
June 2005

ASSESSMENT and QUALIFICATIONS ALLIANCE

SCIENCE: DOUBLE AWARD A (MODULAR) 346006
CHEMISTRY A (MODULAR)
Earth Materials (Module 06)

Tuesday 28 June 2005 Morning Session

In addition to this paper you will require:
- a black ball-point pen;
- an answer sheet.

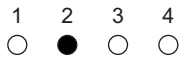
You may use a calculator.

Time allowed: 30 minutes

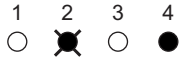
Instructions
- Fill in the boxes at the top of this page.
- Check that your name, candidate number and centre number are printed on the separate answer sheet.
- Check that the separate answer sheet has the title "Earth Materials" printed on it.
- Attempt **one Tier only**, **either** the Foundation Tier **or** the Higher Tier.
- Make sure that you use the correct side of the separate answer sheet; the Foundation Tier is printed on one side and the Higher Tier on the other.
- Answer **all** the questions for the Tier you are attempting.
- Record your answers on the separate answer sheet only. Rough work may be done on the question paper.

Instructions for recording answers

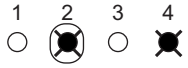
- Use a **black ball-point pen**.
- For each answer **completely fill in the circle** as shown:



- Do **not** extend beyond the circles.
- If you want to change your answer, **you must** cross out your original answer, as shown:



- If you change your mind about an answer you have crossed out and now want to choose it, draw a ring around the cross as shown:



Information
- The maximum mark for this paper is 36.

Advice
- Do **not** choose more responses than you are asked to. You will lose marks if you do.
- Make sure that you hand in both your answer sheet and this question paper at the end of the test.
- If you start to answer on the wrong side of the answer sheet by mistake, make sure that you cross out **completely** the work that is not to be marked.

You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.

The Higher Tier starts on page 12 of this booklet.

FOUNDATION TIER

SECTION A

Questions **ONE** to **FIVE**.

In these questions match the words in the list with the numbers.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

QUESTION ONE

The table is about raw materials and substances made from them.

Match words from the list with the numbers **1–4** in the table.

concrete

glass

limestone

slaked lime

Substance	What we can say about the substance
1	it is a building material made using cement
2	it is a quarried rock used as a building material
3	it is made by heating together limestone, sand and soda
4	it is made from quicklime and used to reduce the acidity of soils

QUESTION TWO

The table is about gases in the Earth's atmosphere.

Match words from the list with the numbers **1–4** in the table.

ammonia

carbon dioxide

oxygen

water vapour

Gas	What we can say about the gas
1	a small amount was present in Earth's early atmosphere
2	it condensed to form the oceans
3	it formed when plants evolved
4	it was the main gas in Earth's early atmosphere

QUESTION THREE

This question is about chemical substances.

Match words from the list with the numbers **1–4** in the sentences.

atoms

compounds

elements

molecules

Carbon dioxide and water are both . . . . . **1** . . . . . .

Carbon dioxide is made up of the non-metal . . . . . **2** . . . . . carbon and oxygen.

In . . . . . **3** . . . . . of water (H_2O), hydrogen and oxygen . . . . . **4** . . . . . combine in the ratio 2:1.

QUESTION FOUR

This question is about rocks.

Match words from the list with the numbers **1–4** in the sentences.

folds

forces

layers

ripple marks

Sedimentary rocks are laid down in . . . . . **1** . . . . . .

Many of these rocks show that they were deposited in water because they have . . . . . **2** . . . . . .

Sedimentary rocks have sometimes been affected by very large . . . . . **3** . . . . . .

This can cause rocks to have . . . . . **4** . . . . . .

QUESTION FIVE

This question is about processes that change things.

Match words from the list with the numbers **1–4** in the table.

cracking

evaporation

neutralisation

oxidation

Process	Example of the process
1	a large hydrocarbon molecule is broken down into smaller molecules
2	hydrogen burns in air to produce water (vapour)
3	liquid water changes to form water vapour
4	powdered limestone is added to a lake to reduce the acidity

SECTION B

Questions **SIX** and **SEVEN**.

In these questions choose the best **two** answers.

Do **not** choose more than two.

Mark your choices on the answer sheet.

QUESTION SIX

Substances **X** and **Y** are hydrocarbons.

These are the formulae:

C_2H_6	$C_{10}H_{22}$
Substance **X**	Substance **Y**

Which **two** of the following statements are correct?

substance Y has a higher boiling point than substance X

substance Y has smaller molecules than substance X

substance Y is more viscous than substance X

substance Y is more volatile than substance X

substance Y will ignite more easily than substance X

QUESTION SEVEN

During the first billion years of the Earth's existence there was intense volcanic activity.

Which **two** of the following were caused by this volcanic activity?

an increase of oxygen in the atmosphere

earthquakes

the formation of an atmosphere

the formation of sedimentary rocks

the release of water vapour

SECTION C

Questions **EIGHT** to **TEN**.

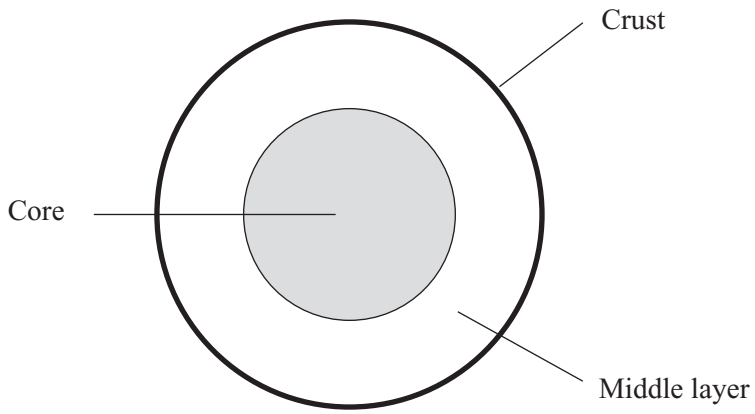
Each of these questions has four parts.

In each part choose only **one** answer.

Mark your choices on the answer sheet.

QUESTION EIGHT

The diagram shows the three main layers in the structure of the Earth.



8.1 The middle layer is called the . . . . .

A lava.

B lithosphere.

C magma.

D mantle.

8.2 The rocks of the crust have a mean (average) density of 2.8 grams per cubic centimetre.

The overall density of the Earth is 5.5 grams per cubic centimetre.

This indicates that . . . . .

A material in the interior is less dense than the rocks of the crust.

B material in the interior is more dense than the rocks of the crust.

C metamorphic rocks are more dense than sedimentary rocks.

D the core is made up of metallic material.

8.3 The radius of the core is about 3 500 kilometres.

The radius of the Earth will be about . . . . .

A 3 500 kilometres.

B 4 000 kilometres.

C 6 500 kilometres.

D 10 500 kilometres.

8.4 Which line correctly describes the Earth's inner core?

	State	**Composition**
A	liquid	aluminium and iron
B	liquid	nickel and iron
C	solid	aluminium and iron
D	solid	nickel and iron

TURN OVER FOR THE NEXT QUESTION

QUESTION NINE

Crude oil is obtained from the Earth's crust.

Crude oil is mainly a mixture of hydrocarbons.

9.1 Which line correctly describes a hydrocarbon?

	Type of substance	Composition
A	compound	carbon and hydrogen only
B	compound	carbon, hydrogen and oxygen
C	mixture	carbon and hydrogen only
D	mixture	carbon, hydrogen and oxygen

9.2 Crude oil is separated into fractions by fractional distillation.

In the fractionating column, the oil separates into fractions when . . . . .

A it evaporates.

B the vapour condenses at 100 °C.

C the vapour condenses at different temperatures.

D thermal decomposition occurs.

9.3 Fractional distillation works because the hydrocarbons in crude oil have . . . . .

A different boiling points.

B different chemical properties.

C exactly the same boiling point.

D the same ignition temperature.

9.4 All the hydrocarbon molecules in each fraction have . . . . .

A a similar number of carbon atoms.

B a similar number of oxygen atoms.

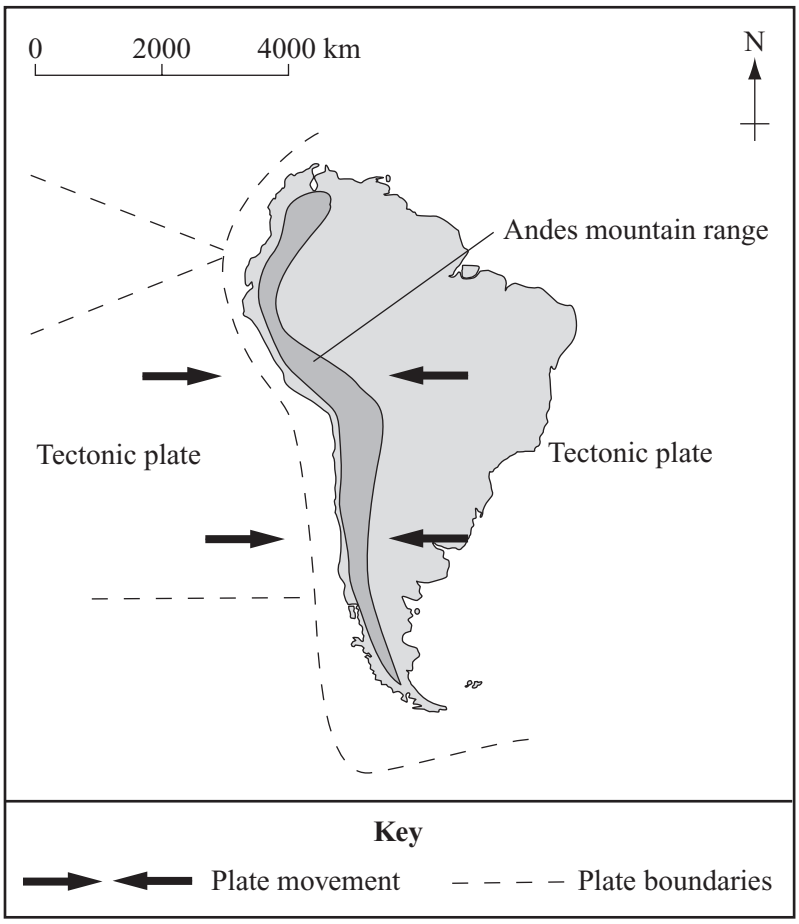
C exactly the same number of carbon atoms.

D exactly the same number of hydrogen atoms.

TURN OVER FOR THE NEXT QUESTION

QUESTION TEN

The diagram shows some structures in South America.



10.1 The movement of the plates is caused by . . . . .

A convection currents in the crust.

B convection currents in the mantle.

C rising magma.

D the rotation of the Earth.

10.2 The plates are moving together at relative speeds of . . . . .

A a few centimetres a day.

B a few centimetres a year.

C a few metres a day.

D a few metres a year.

10.3 Where mountain-building processes are taking place, metamorphic rocks are formed by . . . . .

A eruption of volcanoes.

B high temperatures and pressures.

C radioactive processes.

D shrinking of the Earth's crust.

10.4 New mountain ranges replace older mountains that . . . . .

A are worn down by weathering and erosion.

B melt to form new magma.

C rise even higher.

D sink into the Earth's molten interior.

END OF TEST

You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.

The Foundation Tier is earlier in this booklet.

HIGHER TIER

SECTION A

Questions **ONE** and **TWO**.

In these questions match the words in the list with the numbers.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

QUESTION ONE

This question is about processes that change things.

Match words from the list with the numbers **1 – 4** in the table.

cracking

evaporation

neutralisation

oxidation

Process	Example of the process
1	a large hydrocarbon molecule is broken down into smaller molecules
2	hydrogen burns in air to produce water (vapour)
3	liquid water changes to form water vapour
4	powdered limestone is added to a lake to reduce the acidity

QUESTION TWO

The table contains information about four compounds.

Match words from the list with the numbers **1–4** in the table.

carbon dioxide (CO_2)

ethene (C_2H_4)

methane (CH_4)

sulphur dioxide (SO_2)

Compound	Information about the compound
1	it can form a polymer
2	it is an alkane
3	it is formed when some fuels burn because of an impurity they contain
4	it is released when carbonate rocks are heated

TURN OVER FOR THE NEXT QUESTION

SECTION B

Questions **THREE** and **FOUR**.

In these questions choose the best **two** answers.

Do **not** choose more than two.

Mark your choices on the answer sheet.

QUESTION THREE

During the first billion years of the Earth's existence there was intense volcanic activity.

Which **two** of the following were caused by this volcanic activity?

an increase of oxygen in the atmosphere

earthquakes

the formation of an atmosphere

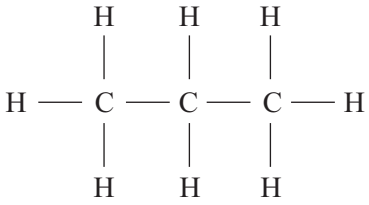
the formation of sedimentary rocks

the release of water vapour

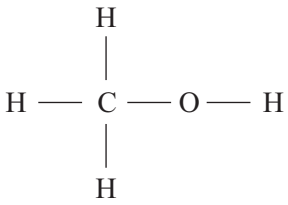
QUESTION FOUR

Which **two** of the substances **P**, **Q**, **R**, **S** and **T** are saturated hydrocarbons?

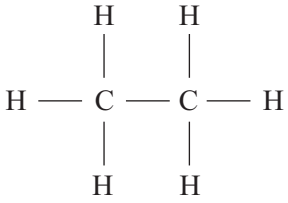
P



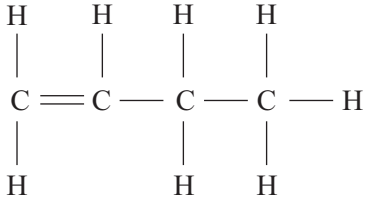
Q



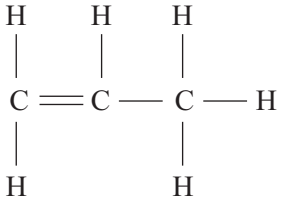
R



S



T



SECTION C

Questions **FIVE** to **TEN**.

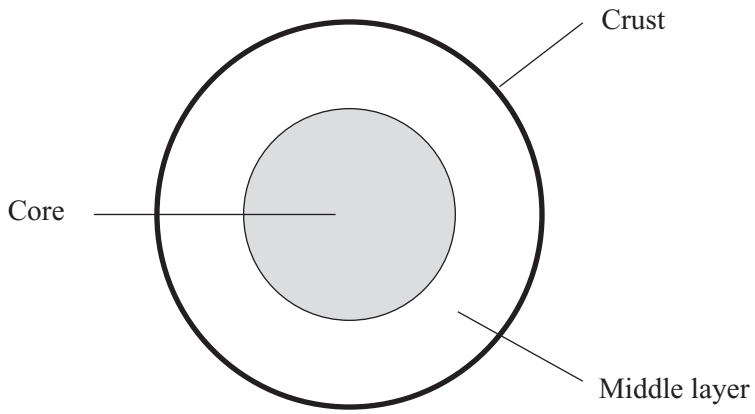
Each of these questions has four parts.

In each part choose only **one** answer.

Mark your choices on the answer sheet.

QUESTION FIVE

The diagram shows the three main layers in the structure of the Earth.



5.1 The middle layer is called the . . . . .

A lava.

B lithosphere.

C magma.

D mantle.

5.2 The rocks of the crust have a mean (average) density of 2.8 grams per cubic centimetre.

The overall density of the Earth is 5.5 grams per cubic centimetre.

This indicates that . . . . .

A material in the interior is less dense than the rocks of the crust.

B material in the interior is more dense than the rocks of the crust.

C metamorphic rocks are more dense than sedimentary rocks.

D the core is made up of metallic material.

5.3 The radius of the core is about 3 500 kilometres.

The radius of the Earth will be about . . . . .

A 3 500 kilometres.

B 4 000 kilometres.

C 6 500 kilometres.

D 10 500 kilometres.

5.4 Which line correctly describes the Earth's inner core?

	State	**Composition**
A	liquid	aluminium and iron
B	liquid	nickel and iron
C	solid	aluminium and iron
D	solid	nickel and iron

TURN OVER FOR THE NEXT QUESTION

QUESTION SIX

Crude oil is obtained from the Earth's crust.

Crude oil is mainly a mixture of hydrocarbons.

6.1 Which line correctly describes a hydrocarbon?

	Type of substance	Composition
A	compound	carbon and hydrogen only
B	compound	carbon, hydrogen and oxygen
C	mixture	carbon and hydrogen only
D	mixture	carbon, hydrogen and oxygen

6.2 Crude oil is separated into fractions by fractional distillation.

In the fractionating column, the oil separates into fractions when . . . . .

A it evaporates.

B the vapour condenses at 100 °C.

C the vapour condenses at different temperatures.

D thermal decomposition occurs.

6.3 Fractional distillation works because the hydrocarbons in crude oil have . . . . .

A different boiling points.

B different chemical properties.

C exactly the same boiling point.

D the same ignition temperature.

6.4 All the hydrocarbon molecules in each fraction have . . . . .

A a similar number of carbon atoms.

B a similar number of oxygen atoms.

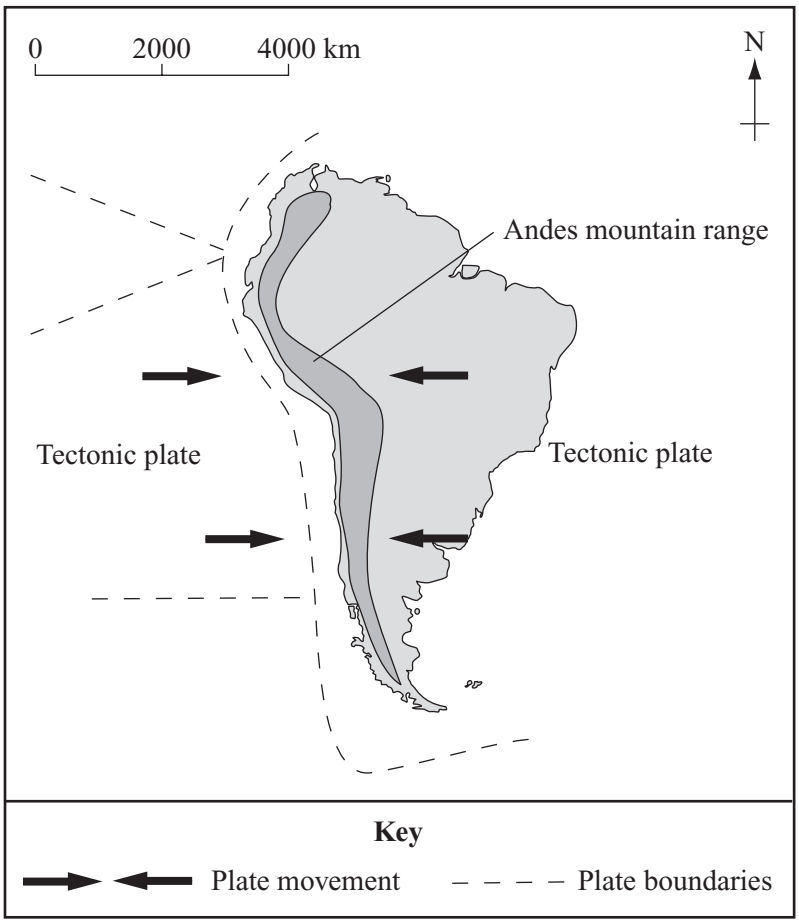
C exactly the same number of carbon atoms.

D exactly the same number of hydrogen atoms.

TURN OVER FOR THE NEXT QUESTION

QUESTION SEVEN

The diagram shows some structures in South America.



7.1 The movement of the plates is caused by . . . . .

A convection currents in the crust.

B convection currents in the mantle.

C rising magma.

D the rotation of the Earth.

7.2 The plates are moving together at relative speeds of . . . . .

A a few centimetres a day.

B a few centimetres a year.

C a few metres a day.

D a few metres a year.

7.3 Where mountain-building processes are taking place, metamorphic rocks are formed by . . . . .

A eruption of volcanoes.

B high temperatures and pressures.

C radioactive processes.

D shrinking of the Earth's crust.

7.4 New mountain ranges replace older mountains that . . . . .

A are worn down by weathering and erosion.

B melt to form new magma.

C rise even higher.

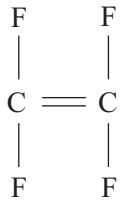
D sink into the Earth's molten interior.

TURN OVER FOR THE NEXT QUESTION

QUESTION EIGHT

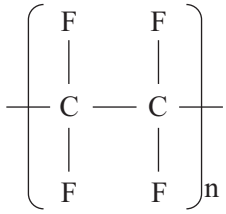
The elements carbon and fluorine form a compound called tetrafluoroethene.

The formula is

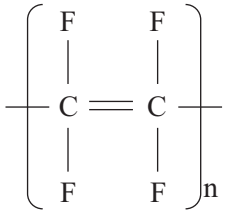


8.1 In a similar way to ethene, molecules of tetrafluoroethene can be joined to make long chains.

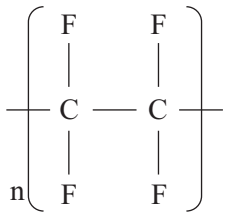
How are these chains represented?



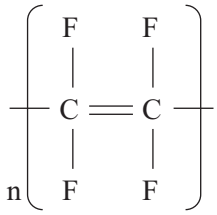
A



B



C



D

8.2 Each molecule of tetrafluoroethene, from which the long chain is made, is called . . . . .

A a fraction.

B a hydrocarbon.

C a monomer.

D a polymer.

8.3 The reaction to form a long chain molecule from smaller molecules is called . . . . .

A cracking.

B fractionating.

C polymerisation.

D saturation.

8.4 In the reaction to join small molecules of tetrafluoroethene together, the products are . . . . .

A poly(tetrafluoroethene) and carbon dioxide.

B poly(tetrafluoroethene) and oxygen.

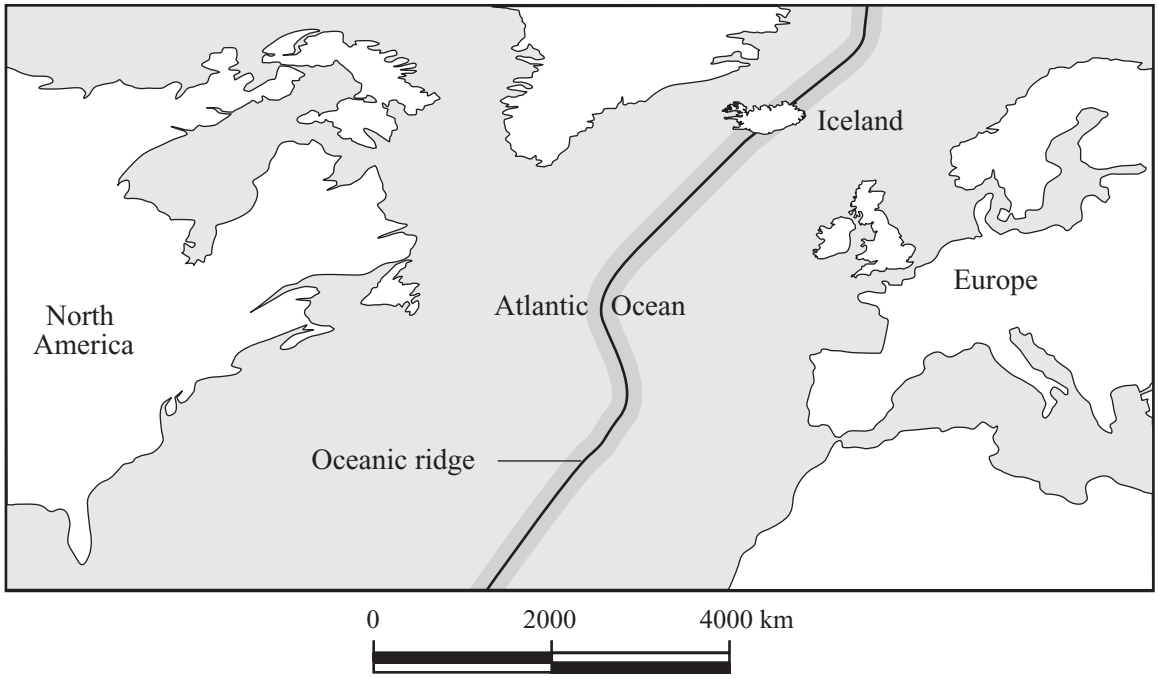
C poly(tetrafluoroethene) and water.

D poly(tetrafluoroethene) only.

TURN OVER FOR THE NEXT QUESTION

QUESTION NINE

An oceanic ridge runs through the Atlantic ocean.



9.1 Why is there an oceanic ridge in the mid-Atlantic?

A It is where there is a line of volcanoes

B It is where two tectonic plates are moving together

C It is where two tectonic plates are moving away from each other

D It is where two tectonic plates are sliding past each other

9.2 What is happening along this oceanic ridge?

A An oceanic plate is being subducted

B Continental crust is being created

C Oceanic crust is being destroyed

D Sea floor spreading

9.3 Where will the youngest basaltic rocks be found?

A Along the coast of Europe

B Along the coast of North America

C Alongside the oceanic ridge

D In the deepest parts of the Atlantic Ocean

9.4 Magnetic reversal patterns close to the oceanic ridge are caused by . . . . .

A contraction of magma as it cools.

B folding and faulting of rocks near the ridge.

C reversals in the direction of the Earth's magnetic field.

D variations in the strength of the Earth's magnetic field.

TURN OVER FOR THE NEXT QUESTION

QUESTION TEN

Since its formation, the Earth's atmosphere has been changing.

About 2 000 million years ago there was quite a rapid increase in the amount of nitrogen in the atmosphere.

10.1 One reason for the increase in nitrogen was the . . . . .

A reaction between ammonia and oxygen.

B reaction between ammonia and ozone.

C reaction between carbon dioxide and oxygen.

D reaction between methane and oxygen.

10.2 Nitrogen was also beginning to be released by . . . . .

A an increase in volcanic activity.

B the activity of some bacteria.

C the burning of fossil fuels.

D the decomposition of sea water.

10.3 By about 450 million years ago, the ozone layer had developed.

By filtering out harmful ultraviolet radiation, this layer . . . . .

A caused an increase in volcanic activity.

B created suitable conditions for the evolution of new living organisms.

C increased the effects of acid rain.

D increased the rate of growth of plants.

10.4 By about 250 million years ago, the Earth's atmosphere was very similar to that of the last hundred years.

More recently, the amount of carbon dioxide has increased slightly.

This is because of . . . . .

A acid rain.

B an increase in volcanic activity.

C an increased use of fossil fuels.

D global warming.

END OF TEST

THERE ARE NO QUESTIONS PRINTED ON THIS PAGE